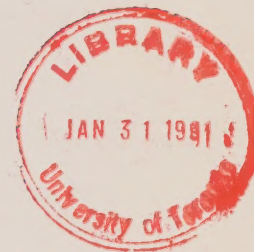Statistics Canada   Statistique
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MEASURING ENTRY AND EXIT IN CANADIAN
MANUFACTURING: Methodology

by

John R. Baldwin[1] and Paul K. Gorecki[2]

No. 23C

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Business and Labour Market Analysis Group
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1990

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Abstract

The dynamics of the competitive process can be better understood with studies of entry and exit, growth and decline in the incumbent population, the effect of mergers, and the importance of the turnover process to productivity growth. Studies such as these require longitudinal data bases. This paper describes the methodology used to build such a data base using material from the Census of Manufactures. The construction of a longitudinal panel from data that were not originally collected with this objective in mind is not easy. This paper outlines the difficulties and the choices that were made to resolve these difficulties. As more and more work is completed both in Canada and elsewhere on the dynamics of the competitive process, inter-country comparisons are increasingly made. This paper is meant to provide the reader of the accompanying studies on Canada to evaluate these studies and to compare them, when appropriate, to the results for other countries that use other data sources.

Acknowledgements

MEASURING ENTRY AND EXIT IN CANADIAN MANUFACTURING: METHODOLOGY

INTRODUCTION

The growth and decline of producers is an intrinsic part of the renewal process in the economy. Entry and exit is an important part of the firm growth and decline process.

Entry and exit can be defined as the emergence of new producing units and the disappearance of old units. Unfortunately, what is relatively easy to define in this manner is difficult to measure precisely. Varying interpretations can be placed on "new" and "old". Data may not be amenable to measuring the concepts desired. As a result, empirical work in this area needs to specify carefully the concepts being measured and the methods being used.

This paper describes the methodology used to generate manufacturing sector entry and exit statistics for the 1970s and early 1980s. It is part of a series of papers that discuss the dynamics of change in Canadian industry (Baldwin and Gorecki, 1989a to 1989g, and 1990). It does not present detailed results; but selected excerpts are included for illustrative purposes.

In order to measure entry and exit, several questions must be answered. The first is the type of study for which the entry and exit measures are going to be used. Although the data bases discussed herein were created basically for studies of the competitive process, they were also used for job-change studies (Baldwin and Gorecki, 1989f, 1990). Measures that are useful for one type of study are not necessarily valuable for another type. Second, there are broad conceptual issues that need to be resolved. What time period, what types of entry and exit, and what level of industry detail should be provided? Third, there are problems that arise during the actual measurement process?

The paper starts by discussing how research with different objectives may require different measures. It then examines the choice of time period, industry definition, and entry categories. Third, a broad overview of the data bases is given and a definition of the entry and exit categories actually used is provided. Finally, the detailed problems of implementation are discussed.

RELATING DEFINITIONS TO OBJECTIVES

Users of administrative and survey data have to proceed cautiously when they employ these sources for purposes that were not originally envisaged. This is especially the case when the appearance and disappearance of identification codes in these data bases are used to define births and deaths. Identification codes can appear and disappear for a number of reasons -- none of which may satisfy the particular definition of entry and exit that the researcher has in mind.

There are many different ways of defining a birth or death, since a firm is defined, not in a single dimension, but by a vector of characteristics. These characteristics include such variables as industry, ownership, country of control, size, and the location and number of plants. The multidimensional nature of the firm's characteristics would be unimportant if only one of those characteristics were required for defining births and deaths, or if all changed simultaneously. Neither is the case.

The nature of the research question determines the definition of a new or an exiting firm that is required. If research is directed at asking how the creation of new firms

affects employment and job turnover in the first instance, then a greenfield definition of a new firm is the most appropriate; that is, the new firm should be one that has arisen because of the construction of new plant. This definition primarily depends upon the plant and employment status variables in the vector of characteristics that define a firm. A new firm is one that builds new plant, thereby generating new employment. A new firm that is simply a reincarnation of an old one under a new name should not be defined as a birth for studies that look at job turnover. Thus, mergers need to be excluded from the new firm definition used to measure job turnover or, at least, they should be treated as a separate category.[1]

Studies of the competitive process require a different definition of birth and death. If research is directed at evaluating the effect of new firm creation on competition, then births should be defined as the creation of new entities. In this case, births should include both entry via greenfield construction (a category that depends upon the plant status variable in the vector of firm characteristics) as well as entry by acquisition of existing plants (a category that depends upon the ownership status variable in the firm characteristics vector). The two different forms of birth should be distinguished, because they may have different effects on performance.

Births and deaths, therefore, need to be carefully defined for the task at hand. It is important to emphasize the complexity of the vector of characteristics that may be required for some tasks. For example, location is of importance to geographers and spatial economists. A firm may change nothing but its plant's location and be considered a new firm in some situations but not in others. In competition studies, a change in location would be important if it introduced a new firm into a regionally fragmented market. It would not be classified as a birth (a new entity) for an industry with a national market. In a regionally oriented study that uses births and deaths to measure regional shifts in production, both events should be classified as births.

The wide range of interpretations that can be placed on the notion of entry and exit means that it is difficult to produce a single estimate that satisfies more than one purpose. Therefore, several data bases were constructed. The following sections describe the nature of the conceptual issues that had to be resolved, the data bases used, and the categories selected.

CONCEPTUAL MATTERS

Decisions have to be taken with respect to such issues as the appropriate level of industry aggregation, the production unit to be used, the time period selected for measurement, and the categories of entry and exit to be employed. The appropriate choices in each of these areas are interrelated.

- Choice of Industry Level

Entry and exit can be measured either at the aggregate level of the manufacturing sector as a whole or at a finer level such as a 4-digit SIC industry. Since interest is usually directed in industrial economics at the extent to which entry and exit facilitates the equilibrating process, statistics at an individual industry level are required.

Nevertheless, entry and exit statistics at an aggregate level can be useful. First, it may be of interest to know how many outsiders to the manufacturing sector establish a new presence therein. Second, where the aggregate data are representative of individual industry level data, aggregate data usefully summarize the underlying trends at far less cost than is entailed in the creation of the individual industry series. When plant entry

is being measured, aggregate data will provide an adequate depiction of the amount of overall entry in individual industries. This is because a new plant in a particular 4-digit manufacturing industry is also an entrant to the manufacturing sector as a whole. Aggregate plant birth and death rates are, therefore, a potentially useful way of summarizing the underlying activity within individual industries.

The usefulness of aggregate firm entry and exit rates is more problematic. The number of firms entering the manufacturing sector need not be the same as the number of firms entering all individual 4-digit industries. A firm may enter a particular 4-digit industry without being an entrant to manufacturing as a whole -- if it already existed in some other 4-digit industry. Aggregate firm entry rates will measure the amount of activity at the underlying industry level if most firm entry at the individual 4-digit industry level is done by firms that are new both to that industry and to the manufacturing sector as a whole. Whether this is the case is an empirical matter.

- Firm versus Establishment Data

Interest in the firm and plant turnover process for industrial economists centres on its role in affecting the evolution of industry profit, innovation, and productivity over time. Such considerations suggest that the appropriate unit of analysis is the firm rather than the individual production unit--the plant, factory, or establishment. It is the firm, not the plant, that makes the decision to enter or exit an industry.

On the other hand, plant entry rates are useful since they give a broad overview of the importance of all new plants that are created by both entering and continuing firms. It is this variable that may have the greatest influence on the equilibrating process that drives down supra-normal profits. For job-creation studies, it is the plant opening and closure process, rather than the new firm creation process -- which also includes a merger component -- that is relevant.

All this means that measures of entry and exit that capture both firm and establishment activity are useful in different contexts.

- Time Period

A choice has to made about the length of time over which entry and exit is to be measured. It can be estimated by comparing the status of firms and plants at two adjacent points in time using annual data, or by using endpoints that are further apart. In the latter case, the status of the firms in the interim is ignored. The first measures yearly rates of change; the latter investigates the cumulative effect of entry and exit over the particular time period. Taken together, the two measures can serve to evaluate the importance of entry as part of the competitive process, as well as the extent to which short-run job-turnover statistics capture mostly transitory or longer-run phenomenon.

One view of the turnover process is that it is essentially marginal in nature. Entrants are perceived to have relatively short lives. If this is true, there will be a group of firms that experience rapid turnover. Under such conditions, entry and exit rates derived from annual data will be very similar to the cumulative rate measured with end years further apart.

A different view of the competitive process holds that some entrants possess enough of an advantage over incumbents that they are able to survive and grow to be of substantial importance. If there are enough such firms, then long-term cumulative entry rates will exceed short-term entry rates.

Since, a priori, it is not clear which of these two characterizations of the entry and exit process are correct, both shorter- and longer-run periods need to be used to measure entry.

Examining plant and firm turnover over both shorter and longer periods is also useful for job-turnover studies. Much of short-run job-change may be transitory in that it is reversed in the longer run. If so, longer-run measures will be much less than short-run measures. Being able to divide the changes in job positions that affect the labour force into a transitory as opposed to a permanent component is of intrinsic interest. Doing so requires both short- and long-run job-change rates.

- Entry and Exit Categories

The type of research also determines the nature of the entry and exit categories to be used. Job-turnover studies require classification systems that emphasize entry and exit of actual production units--plants or establishments. They require that firms and plants be distinguished. It is also important to divide firms into the continuing as opposed to the new and exiting segment in order to measure the relative contribution of each to job growth and decline. For this purpose, distinctions between new, exiting, and continuing firm and plant creation and destruction are required. Studies of the competitive process also require these breakdowns. In addition, such studies will benefit from the addition of a further category -- the entry and exit of firms via the acquisition and divestiture of plant.

It should be noted that the usefulness of the most detailed breakdown of entry and exit is limited where there are few observations in a category. In the short run, many of the entry and exit categories will have zero observations. In the long run, more of the entry categories have non-zero observations and a finer level of detail is justified.

- Resolution

The various issues that have been raised herein were resolved by adopting a set of measures that look at both the long and the short run. Both aggregate and disaggregate data on entry and exit are employed. The aggregate data are used to provide an overview of annual or short-run establishment entry and exit rates; they are also used to measure entry by new firms that created new plants. At the aggregate level, this series provides a reasonable indication of the amount of total activity at the underlying industry level. Disaggregated data are used for longer-run estimates. The most detail is provided for long-run estimates that capture the cumulative value of change. Establishments and enterprises are linked together to allow both new firm and continuing firm plant creation and merger activity to be measured.

THE DATA BASES

The necessity of measuring entry over different periods (the long versus the short run), at different levels of industry aggregation (individual sectors as opposed to the manufacturing sector as a whole), and for different producer units (firms versus plants) resulted in the creation of three different longitudinal data bases. Together, the three data bases allow entry and exit to be measured both at the individual industry level and for the manufacturing sector as a whole, between adjacent years and over longer periods, using firms and establishments--both separately and together.

The Longer-Run 4-Digit Industry Data Base

The first data base measures longer-run entry and exit by comparing the status of production units in 1970 and 1979. It provides detail on both establishment and firm status and links the two. Therefore, it can be used to measure both plant and firm entry and exit. It also allows continuing firm plant turnover activity to be measured so as to provide a standard of comparison for the entering and exiting firm sector. Finally, it measures activity at a detailed 4-digit Standard Industrial Classification (SIC) industry level.

Plant births were defined as the appearance in 1979 of a plant in a four digit industry that had not been in that industry in 1970. A plant closure was equated with the disappearance in 1979 from a four digit industry of a plant identifier that had been in that industry in 1970. A firm entrant was defined as the appearance of a firm code in a four digit industry as of 1979 that had not previously been attached to any other plant in the industry in 1970. A firm death occurs when the firm identifier attached to a plant in 1970 was no longer attached to any plant in the same industry as of 1979. Plants or firms that enter after 1970 and die prior to 1979 are not captured in the entry or exit measures derived from the long-term data base. Firms were defined as all commonly controlled establishments within a 4-digit SIC industry.

With the use of both plant (RSN) and enterprise (ENT) identifiers, it is possible to measure a number of different entry categories. These are summarized in the plant and enterprise status matrix presented in Table 1. Cell identification codes, which are used subsequently to index variables, are also included in the table. The importance of the various categories can be measured using number of establishments, firms, shipments, employment or any other variable available from the Census of Manufactures.

The Annual Establishment and Enterprise Manufacturing Data Bases

The second and third data bases separately track the history of firms and establishments longitudinally on a year-to-year basis from 1970 to 1982. They are used primarily for short-term comparisons. Both these data bases define entry and exit at the manufacturing level as a whole. Births for establishments are defined as plants new to manufacturing. New enterprises are defined in a similar fashion. Plants that switch 4-digit manufacturing industries are not defined as entrants in these data bases. Switches from outside the manufacturing sector--from wholesaling, for instance--are included as entrants in these data bases.

These data bases use an entry and exit classification scheme that is somewhat less comprehensive than was used for the long-run analysis. For the establishment data base, there was a three-fold classification: establishments were either newly created, closed, or continued from year to year. In this data base, no account was taken of the owning enterprise; therefore, whether the plant was acquired or divested was not considered. The enterprise data base used a more detailed classification scheme. On the entry side, new firms were divided into those that did so by greenfield plant construction as opposed to acquisition; a similar distinction was drawn on the exit side.

The annual establishment and the enterprise data bases can be used to answer different questions. With the establishment data base, entry is defined as the creation of a new establishment, death as the closure of an existing establishment. Since the establishment data base covers all plant openings and closings for both continuing, new, and exiting firms, it is useful for measuring the extent to which plant turnover causes changes in employment. The enterprise base allows a distinction to be made between firm entry

Table 1

Plant and Firm Classification Matrix Used to Study
Entry and Exit in Canada's Manufacturing Sector

Plant Status	Firm Status		
	Continuing	New	Dead
Divested	11	n.a.	31
Acquired	12	22	n.a.
Births	13	23	n.a.
Deaths	14	n.a.	34
Continuing	15	n.a.	n.a.
Transfer In	16	26	n.a.
Transfer Out	17	n.a	37

Definitions	Cell	
Entrants	22	Firms that entered the industry by acquiring one or more plants between t and t + n
	23	Firms that entered the industry by opening one or more plants between t and t + n
	26	Firms that entered the industry by transfering one or more plants from one industry to the given industry between t and t + n
Exits	31	Firms that left the industry by divesting one or more plants between t and t + n
	34	Firms that left the industry by closing one or more plants between t and t + n
	37	Firms that exited the industry by transfering one or more plants out of the given industry to another between t and t + n
Continuing	11	Continuing firms that divested themselves of one or more plants between t and t + n
	12	Continuing firms that acquired one or more plants between t + n
	13	Continuing firms that built one or more plants between t and t + n
	14	Continuing firms that closed one or more plants between t and t + n
	15	Continuing firms that owned at least one plant that existed in both t and t + n
	16	Continuing firms that transferred plants into of the given industry
	17	Continuing firms that transferred plans out of the given industry

n.a. = not appropriate

due to openings as opposed to entry due to acquisitions. It also allows the activity of new as opposed to continuing firms to be compared. Similar distinctions on the exit side are also possible using the enterprise data base. This data base can be used to answer questions about the dynamics of the competitive process at the firm level.

In order to comprehend more fully the meaning of the entry and exit measures provided by the three data bases, it is necessary to examine the definitions of establishments and enterprises that have been used and to describe more fully the categories that are employed. This is done in the next two sections.

ESTABLISHMENT AND ENTERPRISE DEFINITIONS

The measurement of entry and exit uses two basic units of production. These are the establishment or plant, on the one hand, and the enterprise or firm, on the other. The terms establishment or plant, and enterprise or firm are used interchangeably herein. Each of the terms needs to be carefully defined if the Canadian data are to be compared not only to those from other countries, but also to other data sets for Canada.

An establishment is defined by Statistics Canada as "usually equivalent to a factory, plant, or mill".[2] The focus of this paper is confined to establishments that are classified to the manufacturing sector.[3] The establishment is the basic statistical unit from which information is collected for the Annual Census of Manufactures.[4]

An enterprise is defined as all establishments in the manufacturing sector under common control.[5] An enterprise is thus a concept that does not necessarily coincide with the legal entity or what is sometimes referred to as the business or corporate entity. The relationship between the legal entity, the establishment, and the enterprise, is summarized by Statistics Canada:

There is in fact an intermediate level of organization between the establishment and the enterprise, the legal entity. This is the ownership unit. Legal entities may be incorporated or unincorporated businesses, or individuals. One legal entity may own another legal entity; therefore, it is possible for an enterprise to control more than one legal entity, just as a legal entity may own more than one operating unit--an establishment (Statistics Canada, 1983, p.24).[6]

Since an enterprise is defined as the unit that groups all commonly owned establishments, sub units can be created that combine all commonly owned establishments in a particular industry grouping (the 2, 3 or 4-digit industry). Thus, firm entry can be measured at the individual industry level or for the manufacturing sector as a whole. The finest level of detail (the 4-digit level) is selected for the longer-run 1970-79 data base. The annual entry and exit rates are measured using the manufacturing sector as a whole. When results from one set are compared to another, it must be remembered that the two estimates need not be the same for the reasons discussed previously.

DATING ENTRY AND EXIT

Each establishment is assigned a unique identification number, the record serial number or RSN.[7] This number remains with the establishment as long as it is included in the Census of Manufactures.[8] Each enterprise is also assigned a unique identifier-- referred to here as the ENT code. Unlike an establishment's RSN, the enterprise code can change when one enterprise purchases another.

A birth of a plant or enterprise is defined to occur if a new identifier code appears. An exit is defined to occur when the code disappears. If the code continues over the period being studied, the plant or firm is defined as continuing. The short-run data base uses

adjacent years from 1970 to 1982 to compare the status of establishments. The longer-run data base compares their status in the first and last year of the 1970s.

Exit and entry were defined first by the status--the continuation, the discontinuation, or the creation--of the identification code of a plant and secondly, by the level of activity. Entrants are counted in the first year that the identifier appears and the employment or value of manufacturing shipments was positive: exits are defined to occur in the first year prior to or equal to the actual disappearance of the identifier when the employment or value of manufacturing shipments falls to zero.[9] The latter criterion serves to exclude from the exit count those production units that, for some reason, had already ceased to be active participants. Use of the identification number alone in these cases, without consideration of whether production occurs, may cause the date of actual exit (based on production) to be estimated with a lag, since administrative systems and censuses are sometimes slow to purge themselves of defunct producers.

VALIDATION OF IDENTIFIERS

Entry and exit are measured by examining changes in enterprise and establishment identifiers. This section examines the reasons why these identifiers appear and disappear.

- The Establishment Code

Plant entry and exit is defined to occur with the appearance and the disappearance of an establishment code (the RSN). Whether this definition produces meaningful estimates of births and deaths depends upon the practice of the statistical agency in assigning establishment codes. The closure of an establishment is usually grounds for the retirement of a code; but there may be situations where continuing plants are reassigned RSN codes--where the old code is dropped and a new one assigned. If continuing establishments are reassigned codes, then deaths and births will be overestimated.

Difficulties in this area arise because establishments, like firms, possess several characteristics. Some can change during the lifetime of a plant and cause the administrative coding system to assign a new plant number even though there has been no plant death. For instance, if changes in ownership triggers a reassignment of a code, then death and birth will not correspond just to the opening and closing of a plant.

The meaning of an establishment birth and death then depends upon the type of events that cause the statistical agency to reassign RSN codes to plants that have not shut down. The rule used by Statistics Canada is to discard codes in the case of a continuing plant and to assign a new one only if location, ownership, and name of the establishment all change simultaneously.[10] This rule precludes counting as an establishment death the situation where there has just been a change in the ownership or in the name of the plant.

The validity of entry measures that are developed depends upon the diligence with which Statistics Canada followed this rule. Two tests were employed to examine this. First, all cases were examined where a plant identifier that existed in 1981 had disappeared by 1985. All such plants were compared on the basis of their recorded names, ownership, and location to see if new plants could be found for the year 1985 that had similar names, ownership and location as one of the plants that had "died". Of the plants in existence in 1981, 12,076 had disappeared by 1985. These plants employed 206,668 workers in 1981. Of these only 10 plants, with 209 employees could be found

that might have been coding errors; that is, only 10 new plants could be found in 1985 that appeared to be the same as a 1981 plant that had lost its plant identifier number. This suggests that the overstatement of the death rate, when measured using the disappearance of a plant identifier, is insignificant.

Administrative problems might also serve to cause the opposite type of error. If plant identifiers are reassigned when they should not be, there will be an underestimate of the 1981 death rate and the 1985 entry rate. The frequency of the opposite type of error was also investigated. Plant identifiers in 1981 and 1985 were examined to see whether two identical plant identifiers could be found, where the recorded name, ownership, and locations all changed. These plants should have had their 1981 identifier codes changed and new ones assigned by 1985. Some 18 such plants with total employment of 1298 were found. Once again the number of plants in this category made up an insignificant percentage of total exits.

Errors of the first type would cause an upward bias in the plant death and birth rates; errors in the second category would cause a downward bias in the plant death and birth rates. The errors in each case were small and essentially offsetting. Moreover, the errors were probably overstated since the identification of potential coding problems relied on mechanical computer routines and the existence of actual coding errors was not pursued further because the maximum potential error rate was already quite low.

In conclusion, because of the nature of the criteria used for the reassignment of the RSN plant identifier and the care used by Statistics Canada in following this criteria, the emergence of new establishment codes and the disappearance of old ones in the Canadian Census of Manufactures can generally be ascribed to "real" births and deaths. This is not the case in some other data bases where a change in legal entity is often sufficient to cause a code to be dropped and a new one to be created.[11] In this study, ownership and name of the plant can change, but as long as the location does not, there will be no change in the identifier and no false indication of a plant birth and death.

- The Enterprise Code

Enterprise identifiers (ENT codes) were used to track groups of establishments under common control. The same ENT identifier was assigned to all plants in manufacturing, logging, and mining owned by the same enterprise. This is not a code that corresponds to the legal entity, but one that is meant to relate to the concept of an enterprise that was discussed previously. Legal entity (BRID) codes do exist; new values of BRID codes are created and old ones discarded with a change in legal entity--such as an incorporation, an amalgamation, a reorganization of establishments, or a change in ownership. Since the identity of the legal entity changes much more frequently than does the enterprise that controls the legal entity, the use of a legal entity (BRID) code can generate "false" births and deaths. Births are false for our purposes, if they involve only minor changes that fall neither into the entry by building new plant nor the entry by acquisitions categories that were defined previously.

Changes in the ENT code in the data base, by way of contrast, basically reflect only major changes in enterprise organization. An appearance of an ENT code in an industry should signify an entry by plant birth or by acquisition--where acquisition is broadly defined to include control changes. These do not necessarily result in the merger of the facilities of the acquired firm with those of the acquiror. The disappearance of an ENT code should, likewise, be a death. As was the case with establishments, ongoing operations of enterprises are not supposed to have their codes retired and new ones assigned without good cause. However, in contrast to the case of the establishment,

rules for reallocating ENT codes of ongoing enterprises are not as precisely specified. One reason for this is that the events that would have to be included in any definition are more complex. The rule as to name, location, and ownership used for a plant identifier change would not suffice.

ENT codes are supposed to change only when a major event takes place in the life of the enterprise. The extent to which this occurs in the data base was carefully examined. Not all categories where an ENT code appeared or disappeared had to be checked. Since each establishment was assigned both an RSN and an ENT code, attention was focused only on those establishments involved in either a firm entry by acquisition or a firm exit by divestiture (categories 22 and 31 in Table 1). This serves to eliminate those cases where the death or the birth of an enterprise was accomplished by the closure or the opening of an establishment (categories 23 and 34). Because of the care used by Statistics Canada in discarding and assigning establishment codes, the latter set of events were likely to have been associated with genuine enterprise deaths and births accomplished by plant closure or plant opening.

In order to evaluate the types of changes that occurred when an ENT code disappeared or appeared during the acquisition and divestiture of a plant, all establishments so affected were assigned to one or more categories. This served two purposes. The first was to evaluate the importance of the changes in the data base that were being classified as acquisitions and divestitures. The second objective was to isolate the number of cases where the ENT code had changed for only minor reasons, such as a name change that was not accompanied by a major event. Defining what is minor is more difficult than defining what is major. Therefore, a procedure of backward elimination was employed. Those cases where a major reorganization occurred were eliminated and then the residual category was examined.

Three events were defined as sufficiently major to rule out minor organizational changes. The first event was a change in the country of control of the enterprise that owned the plant in 1970 as compared to 1979.[12] The second event was finding that either the acquiring firm or the divesting firm continued throughout the decade. In the former case, this meant the acquiring firm possessed a plant in some 4-digit industry in 1970 other than the one in which the acquired plant was located in 1979. In the latter case, this meant the firm, which exited an industry by divesting itself of plant, could be found in some other industry in 1979. The third event was defined as the presence of a horizontal merger. This occurred when the firm that entered by acquisition did so by acquiring plants from more than one enterprise. It is unlikely that any of the major events outlined above could have occurred without there having been a major organizational change.

Each plant that was acquired or divested was categorized on the basis of the major event categories. The categories are not mutually exclusive, so a plant could be placed in more than one category. Table 2 contains a summary of the importance of the categories for plants acquired by entering firms. The importance of a category in Table 2 is measured as the ratio of the sum of the 1979 shipments of all plants in all industries contained in that category, divided by 1979 shipments of all acquired plants of entering firms. Table 3 contains a similar summary for plants of firms that exited by divestiture but uses 1970 shipments to measure importance.

Entry and exit was broken down first into that which involved continuing firms as opposed to non-continuing firms.[13] So, for example, 47.1 per cent of 1979 shipments of acquired plants of entering firms were in plants where the entrant could be found in some other 4-digit industry in 1970. Then each of these categories was divided on the

Table 2

The Importance of Different Events Associated
with Firm Entry via Acquisition:
calculated as the percentage of
1979 manufacturing shipments of all acquired
plants that fall in a particular category

Category	Ratio for all Acquired Plants		
	(%)		
A) Entry by Continuing[1] Firms	47.1		
1) Country of Control Change[3]		18.2	
i) Horizontal Merger[2]			3.2
ii) No Horizontal Merger			15.0
2) No Country of Control Change[3]		28.9	
i) Horizontal Merger[2]			4.6
ii) No Horizontal Merger			24.3
B) Entry by New Firms	52.8		
1) Country of Control Change[3]		24.6	
i) Horizontal Merger[2]			2.0
ii) No Horizontal Merger			22.6
2) No Country of Control Change[3]		28.2	
i) Horizontal Merger[2]			2.9
ii) No Horizontal Merger			25.3
Total:	100	100	100

Note: 1) A continuing firm is one that can be found in some other
4-digit industry in manufacturing in both 1970 and
1979.
2) Horizontal mergers occur when multiple acquisitions
are made. The importance of horizontal mergers is
measured by the value of the shipments of the smaller
plants that were acquired in the acquisition.
3) The country of control category divided control
into domestic, U.S., U.K., other Europe, and other.
4) Calculating these ratios for each of 167 industries
and then averaging them yielded essentially the same
results.

Source: Special Tabulations: Business and Labour Market Analysis
Group. Statistics Canada.

Table 3

The Importance of Different Events Associated
with Firm Exit by Divestiture:
calculated as the percentage of 1970 manufacturing
shipments of all plants divested by exiting firms
in a particular category

Category	Ratio for all Plants		
		(%)	
A) Exit by Continuing Firms[1]	30.5		
1) Country of Control Change[3]		15.0	
i) Horizontal Merger[2]			0.7
ii) No Horizontal Merger			14.3
2) No Country of Control Change[3]		15.5	
i) Horizontal Merger[2]			1.0
ii) No Horizontal Merger			14.5
B) Exit by Disappearing Firms	69.4		
1) Country of Control Change[3]		27.7	
i) Horizontal Merger[2]			4.4
ii) No Horizontal Merger			23.3
2) No Country of Control Change[3]		41.7	
i) Horizontal Merger[2]			6.6
ii) No Horizontal Merger			35.1
Total	100	100	100

Note: 1) A continuing firm is one that can be found in some other
4-digit industry in manufacturing in both 1970 and
1979.
2) The importance of horizontal mergers is measured by the
value of the shipments of the smaller plants that were
acquired in the acquisition.
3) The country of control category divided control into
domestic, U.S., U.K., other Europe, and other.
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then averaging them yielded essentially the same
results.

basis of the existence or nonexistence of a country of control change. Thus, 18.2 per cent of shipments were in plants where the entering firm could be found in another industry in 1970 and where the transfer of ownership involved a country of control change. Finally, each of the latter was then divided on the basis of whether there was a horizontal merger involved.[14]

Almost half of 1979 shipments of acquired plants of entering firms were in plants acquired by firms that possessed plants in another Canadian industry in 1970. These were diversifying mergers and not a minor form of corporate reorganization. Some 43 per cent of shipments in plants acquired by new firms were affected by a country of control change (rows A1 plus B1 in Table 2). Horizontal mergers within the acquisition and divestiture category were less important. Around 13 per cent of shipments in 1979 were in plants that were merged with other plants within the same industry at some time during the decade (rows A1i, A2i, B1i, and B2i), and were also part of the acquisition process that brought new firms into an industry. After all the major event criteria were applied, only 25.3 per cent of shipments were not involved in a take-over by an existing Canadian firm, a country of control change or a horizontal merger (row B2ii).

Table 3 contains a breakdown similar to Table 2; but the percentages here are calculated using the shipments of divested plants as of 1970. The data show that the remaining category where divestiture was not accompanied by a horizontal merger, a country of control change, or the continuation of the divesting firm in another industry (row B2ii) is somewhat larger than for the first table--35.1 per cent.

The two sets of plants in each of the residual categories in Tables 2 and 3 do not entirely overlap. When the major event criteria were imposed simultaneously on both acquired and divested plants, there were only 8.6 per cent of all plants with about 9.5 per cent of shipments remaining that might not have been involved in a significant reorganization.

The plants in the residual category were checked manually. Ultimately, 3.4 per cent of the original establishments with 1.6 per cent of employment turned out to have involved a minor change in enterprise status like a name change. Reclassification of the group from acquisition and divestiture (categories 31 and 22) to continuing (category 15) had no effect on the importance of these categories as is reported in Tables 5 and 6.

The horizontal merger cases that involved acquisition and divestiture were also carefully examined. It is possible that, if the ENT code did not track control upwards very precisely beyond low level identifiers, there might have been a large number of these merger cases where a parent firm was simply reorganizing its corporate divisions over time into new legal entities. In this sample, this was not the case. The merger situations were genuine.

In conclusion, an examination of the different methods of entry by acquisition and exit by divestiture serves several purposes. First, by distinguishing between entry by existing firms and entry by new firms, a determination can be made as to whether the firm population is being genuinely reborn or just reshuffled. On this issue, the data indicate that a substantial component of the firm entry by acquisition category involves diversification.

Secondly, it gives an idea of the extent to which the entry and exit by acquisition and divestiture categories involve major change. Because of the way in which new firm identifiers are issued in many administrative data bases, there is always the possibility that the phenomenon being measured is not associated with a major change in control

or operating group structure.[15] Corporate reorganizations that result in a new legal structure but no change in ownership, operating structure or policies can occur for a number of reasons--for example, tax reductions. The validation checks of the enterprise identifiers that were carried out indicate that changes therein capture important economic events. They are not mere name changes, minor corporate reorganizations, or coding errors.

IMPLEMENTATION PROBLEMS: GENERAL ISSUES

The broad conceptual issues as to time horizon, industry detail, and the entry and exit categories to be adopted are relatively straightforward to resolve. More difficult are the problems associated with the peculiarities of individual data bases that make precise measurement a problem. This section provides a broad overview of some of these problems and their severity for the data taken from the Census of Manufactures that were used herein. A more detailed description of the specific resolution of each problem is reserved to subsequent sections where the difficulties experienced with each data base are presented.

- Coverage

The value of entry and exit statistics produced by a data base will depend upon the comprehensiveness of the coverage provided by the data base. Data bases like the Dun and Bradstreet records used by Birch (1979, 1981) and the U.S. Small Business Administration (1984) are incomplete--being constructed only from the records of those companies that wish to be placed on these files for credit rating purposes. Other data bases, like the ones constructed by Storey[16] and his colleagues in the U.K. are built from different sources, none of which purports to be a complete census.

Use of the Canadian Census of Manufactures to measure entry and exit overcomes these problems in large part. The Canadian data, cover all firms in the manufacturing sector, and are collected by the official statistics agency. These data embody the professional expertise and extensive coverage associated with the collection of national censuses.

Problems can also arise for longitudinal data bases not so much because coverage is incomplete, but because it is not current or because it changes over time. This is often the result of there being a lag in adding new firms to a data base or in purging it of firms that have exited. Sudden bursts of activity to catch existing firms that may have been overlooked or to purge the files of defunct producers can generate a spurious level of measured entry and exit for a particular year. Johnson and Storey (1985), for instance, warn that there were sudden purges of Dun and Bradstreet files in the late 1970s that lead to biases in exit rates calculated with this data base for that period. Similarly, they point out that new firms are entered in the data base with such a lag that measuring entry and exit on an annual basis is impractical.

Because the Canadian census is annual, it is generally not affected by these problems. An effective method for finding new plants and firms exists--through the use of administrative tax files. Moreover, failure of a previously existing producer to file a census return is followed up by trained personnel to ascertain the status of the firm or plant. The Canadian census is, therefore, generally both comprehensive and current. Meaningful annual rates of entry and exit can be derived therefrom. There will be some lags and omissions but they will be minimal compared to alternate sources.

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The Canadian census data are not completely immune from the problem of changing coverage over time. A change in coverage occurred in the mid 1970s. However, information exists that allows the precise effect of changing census coverage to be estimated.

The 1970-79 data base that has been developed to measure entry and exit in the long run should not be affected by this problem since many of the missed entrants in the mid 1970s will have been restored by 1979. However, the establishment and enterprise data bases that are used to measure annual rates of entry were affected and modifications were required to handle this problem. These are discussed in a subsequent section.

- Sample Choice

The advantage of using an official census is based on the extensive coverage such data provide. The disadvantage is that it can be extremely costly to employ all records for the analysis. Moreover, it must be remembered that not all records are of equal quality.

An establishment that is surveyed directly by Statistics Canada for the Annual Census of Manufactures may receive either a long-form or a short-form questionnaire. The distinction between the two is:

The long-form is a fully detailed questionnaire sent to establishments with shipments above minimum sizes which vary by province and by industry and from year to year, designed to capture all but a small percentage of the shipments of the industry. In 1975 long-forms accounted for all but 4.1 per cent of the value of shipments of goods of own manufacture of the manufacturing industries. The short-form is a simplified, abbreviated questionnaire, bearing a closer resemblance to a typical income statement. It is sent to small manufactures whose shipments fall below a minimum size (Statistics Canada, 1979, p.10).

Some very small plants do not receive either a short- or long-form. Data for these small plants are taken from taxation administrative records in place of mailed questionnaires. In the late 1970s and early 1980s, both types of small establishments[17] accounted for 5 per cent or less of all manufacturing shipments: 2.0 per cent in 1970, 4.1 per cent in 1975, and 3.4 per cent in 1982.[18] In contrast, such establishments accounted for 40 per cent of all manufacturing sector establishments in 1970, 50 per cent in 1975, and 53.9 per cent in 1982.[19]

Understanding the difference between large and small establishments is important because it is sometimes opportune, for cost reasons, to work with only a subset of all establishments when entry and exit is measured. Moreover, the creation and disappearance of small establishments may be sensitive to the diligence used in finding these small establishments. This, in turn, can vary year by year depending upon the budget constraints faced by the statistical agency and official concern about the paper burden imposed on smaller firms.

In this study, typically only long-form establishments are used for the reasons described above and because the use of the long-form sample permits more characteristics of entrants to be measured consistently. This is because the long-form data contain more detailed information on plants' activities and because certain concepts, such as value-added, are not defined in the same way for long- and short-form establishments.[20]

The impact of using this sample was investigated by comparing entry and exit rates using the universe of census establishments and just the long-form sample. For this purpose, the longer-run data base, with initial year of 1970 and terminal year of 1979, was

employed. The long-form sample yields a much lower rate of entry and exit than the entire sample when numbers of plants and enterprises are employed; but its use does not greatly affect the estimate of these rates when measured in terms of employment or shipments.[21] This is discussed further below. Small establishments are numerous but account for an insignificant percentage of total employment.

The same reasons that led to the selection of only long-form establishments also determined the choice of enterprises that only owned long-form establishments for both the long- and the short-term data bases. An enterprise is defined in the Census of Manufactures in terms of the establishments it owns. The establishments of larger enterprises typically are classified as long-form; small enterprises as short-form.

Adoption of the long-form sample does create certain addition problems. The cut-off between a short- and a long-form establishment was changed drastically in 1975. This does not create any major problems for the longer-run data base. It would if a comparison was being made of the periods 1970-75 and 1976-80, because there would be slightly fewer entrants in the latter period. It creates more of a problem for the measurement of annual rates of entry and exit in that a discontinuity develops in the middle of the period. Discussion of these problems will be found in a subsequent section.

- Units of Measurement

The importance of entry can be measured either in terms of numbers of establishments and enterprises, or their outputs and inputs. Both sets of measures are used. Entry and exit rates calculated using numbers reveal whether entry and exit is easy; when calculated using an output or input size measure, they indicate whether it is important. Both shipments and total employment (wage and salary earners) are used to measure size. Shipments is the most logical measure to use for studies of the competitive process because it indicates what share of the market entrants are able to capture. Employment is also used to provide information on the contribution of entry and exit to job turnover.

Throughout, employment is derived from the total activity statistics available from the Census.[22] It is reported by the Census as an annual equivalent. For example, if a plant employs 60 workers per month for six months, this is recorded as 30 person-years. In some cases, this procedure might produce a downward bias in the estimates of entry and exit--for 60 not 30 people are affected by the exit of the above-described plant. This, in turn, would affect calculated rates of entry and exit because, presumably, the employment of continuing plants, which forms the denominator of this calculation, will not be affected to the same degree by this factor. One approach would be to assume that entrants and exits are distributed uniformly across the year--that they have an average life of half a year. All raw employment figures for entry and exit would then be doubled.[23]

This is not the practice that has been followed herein. It is felt that there is enough of a reporting lag in the Census that employment totals for the first and last reporting year of an establishment are for essentially a full-year's operation. This was tested by examining employment in enterprises that exited, both in the year of exit and the preceding year. The differences were relatively minor and certainly not of an order of magnitude of 100 per cent, which the doubling rule would imply.

- Definitional Nuances

After the categories to be measured have been determined, problems of implementation remain, because there are some cases where alternative definitions can be used to

measure a particular entry and exit category. Two questions were examined carefully. The first was whether plants that are switched from one industry to another should be counted as establishment deaths and births. The second was whether horizontal mergers occurred in the divestiture and acquisition categories (22 and 31 of Table 1). The third was the extent to which the various firm entry and exit categories overlapped.

Plant reassignment as entry. Establishment entry is defined as the appearance of a new plant. A new plant may appear in a particular 4-digit industry because it did not exist in the Census of Manufactures. It could also be that it existed previously in some other industry but was switched to the new one. An establishment is assigned to an industry on the basis of the commodities that it produces. As a plant's commodity output changes, the industry to which it is assigned may change. Switches occur because plants that were previously concentrating on products assigned to other industries are now more heavily concentrated on products in the industry in question.

The appropriate treatment that should be accorded plants that were reassigned from one industry to another is difficult to specify. The reassignment of an existing plant from industry M to industry N leads to a shift in employment of the plant from industry M to N; but it does not generally tend to create new employment in N equal to the total work force of the reassigned plant. Therefore, entry measures that include this form of entry in N, at first glance, appear to overstate the job creation and destruction associated with entry and exit. This argument would suggest that, for job turnover studies aimed at measuring the growth and decline of jobs at the level of the producer, switches should be excluded. On the other hand, for studies of competition, switches are important because they bring new participants into the industry.

The matter was resolved by measuring the importance switches using the long-run data base. For the short-run data base, plant switches from one 4-digit industry to another within manufacturing are not a problem. However, at the aggregate level being used here, entry and exit switches may occur if plants are reassigned from manufacturing to wholesaling. In the short-run data bases, switches are included as entrants and exits and no attempt was made to measure their precise magnitude. But their importance was explored and the results of this exercise are reported in the discussion of these data bases below.

Plant consolidation as merger. Measurement of entry and exit is done by assigning plants or firms and either their outputs or inputs to one of the categories outlined in Table 1. When plants are used, the categories are mutually exclusive. But they may not correspond exactly to the concept required.

This is the case when category 11 is used exclusively to measure horizontal mergers. This category contains the plants that are acquired by a firm that continues to own other plant in the industry in question. These are clearly horizontal mergers. The acquisition category (22 in Table 1) does not generally contain horizontal mergers. For example, in the long-run data base, the acquiring firm, by definition, did not have plant in the industry in 1970 and under most circumstances its acquisition, therefore, does not bring plants together horizontally. There are, however, some circumstances where a horizontal merger can be contained in this category. If the acquiring firm makes multiple acquisitions of firms within the same industry between 1970 and 1979, this will be the case. This will also occur if a horizontal merger is consummated prior to the acquisition that brings a new firm into the industry.

Therefore, an examination was made of the extent to which the horizontal component of the acquisition category was large. This is reported in the discussion of the long-term data base.

Overlap in Firm Entry Categories . When entry and exit is defined in terms of plant numbers, there are few problems of overlap. Plants fall exclusively into one or other category. The one exception pertinent to the case of horizontal mergers has been discussed above.

The overlap problem is potentially more serious when the number of firms is used to measure entry. Firms may enter by building new plant, by acquiring new plant, or by doing both. Continuing firms may build new plant, divest plant, and acquire plant. This creates several potential difficulties. The percentages in various categories no longer sum to 100. The comparisons of entry intensity across industries then can be influenced by differences in the intensity of multiple category activity. The importance of this problem was investigated using the longer-run data base.

IMPLEMENTATION ISSUES: SPECIFICS

The previous sections of the paper have described and discussed in a general fashion the definitions and choices made in generating three data bases for studying various aspects of entry and exit. The following sections examine each of the data bases in greater detail. Emphasis is given to the way in which the implementation problems were resolved.

The Longer-Run Data Base

In the short run, the cyclical and stochastic components of firm growth and decline tend to overwhelm the structural trends. This is also the case with entry and exit. Because it was felt that the importance of entry and exit would emerge only in the longer run, the long-run data base provides the most detail. Entry and exit are measured at the 4-digit industry level. All of the categories in Table 1 are used. Sample choice. As has been indicated, the extent of entry and exit can be estimated using the entire universe of firms and establishments or the reduced long-form set. There are advantages to using only the reduced set of long-form establishments. But before this sample is used extensively, it is important to evaluate the effects of doing so.

Table 4 contains the percentage of all 4-digit industries for which there were non-zero observations in each of the entry and exit categories. The coverage ratios are presented both for the entire set of establishments in each industry and for only the long-form sample. It is evident that the choice of the long-form sample does not greatly affect coverage. For the long-form sample: in 94.0 per cent of the industries, firms entered by building new plant; in 96.4 per cent, there were exiting firms that closed plant. Entry via acquisition of plant and exit via divestiture of plant occurred in 88.6 and 91.0 per cent of the industries respectively. Continuing firm plant birth and closing was some-what less extensive but still important. Continuing firms opened plant in 73.6 per cent of the industries and closed it in 74.8 per cent. Coverage was lowest for the continuing firm acquisition and divestiture categories. Continuing firm horizontal mergers occurred in 52.7 per cent and plant divestitures in only 32.3 per cent of the industries.

Table 5 contains two estimates of the importance of the various entry categories using both number of establishments and the value of shipments. Table 6 contains two estimates of the exit categories. The first estimate in each case uses the entire set of observations; the second uses the long-form sample. The importance of a category is

Table 4

Percentage of Industries with Non-Zero
Observations the Various Entry and Exit Categories
Across 167 4-digit Canadian Manufacturing Industries:
1970-1979

		Firm Status					
Plant Status		Continuing		Entrant		Exit	
		All Obs	Long Form Sample	All Obs	Long Form Sample	All Obs	Long Form Sample
a)	Divested	32.9	32.3	-	-	91.0	91.0
b)	Acquired	52.7	52.7	88.6	88.6	-	-
c)	Birth	74.8	73.6	99.4	94.0	-	-
d)	Closed	74.9	74.8	-	-	97.6	96.4
e)	Continuing	100.0	100.0	-	-	-	-

Notes: 1) See Table 1 for definition of the plant and firm
          status. All entry and exit categories are measured for
          the period 1970-1979.

       2) Plant switches are not considered when calculated
          category c or d.

Source: Special Tabulations: Business and Labour Market Analysis
        Group. Statistics Canda.

measured relative to the totals for the set used--all observations in the first case, only long-form observations in the second. The estimates presented in Tables 5 and 6 are the average of the importance of each category taken across 167 4-digit industries.

It is evident that the use of the long-form sample affects the importance of entry and exit when numbers of establishments are used; but it has much less of an effect when shipments are used. When all observations are employed, 36.9 per cent of all establishments in 1979 were newly built since 1970 by entering firms; but only 18.8 per cent of the long-form sample fell in this category. Using share of shipments, the differences are much less -- newly built plants of entering firms accounted for 14.4 per cent and 11.5 per cent of total shipments for the two data sets. The difference between the results yielded by the two data sets is even less for the other entry categories.

It is evident that the long-form sample may be used to measure the shipment values affected by entry and exit without great distortion. This conclusion also applies to other measures of input or output.[24]

- Entry of completely new as opposed to reassigned plants

Since establishment entry and exit can be defined either inclusive or exclusive of plants that have been switched from one industry to another, the magnitude of the plant switching category was investigated. In order to do so, all continuing establishments that were assigned to an SIC code in 1979 that differed from that assigned in 1970 were defined as entrants in 1979 to and exits in 1970 from the relevant 4-digit SIC industry by plant switching. Plant switches were divided into two categories: those attached to entering firms and those attached to continuing firms. In the former case, the plant switch brought a new firm into an industry. In the latter case, the firm, whose plant was reassigned to a new SIC, already possessed a plant therein. A firm's status--new as opposed to continuing--depends on its possession of plant in a particular 4-digit industry.

Tables 5 and 6 also contain estimates of the importance of entry and exit via switching. The rate of new firm entry via switching was 4.6 per cent using shipments and the long-form sample. This rate is not greatly affected by the sample chosen. The rate at which new firms are brought into an industry by plant switches can be broken into two subcategories. The first (row 3b, Table 5) are those that involved a change in plant ownership (1.1 per cent of total industry shipments using the long-form sample) and which might be included in entry by acquisition (category 22). This group is about 10 per cent of the entry by acquisition category that does not include plant switches (row2, Table 5). The second category (row 3a, Table 5) consists of those plants that did not involve a change in plant ownership (3.5 per cent of total industry shipments). These might be included in the entry by new firm new plant class (category 23). Their shipments are equal to some 30 per cent of the new firm entry by plant building category that does not include switches (row 1, Table 5).

The result for exits mirrors that on the entry side. Switches that do not involve a change in ownership can increase the firm exit rate by plant closure by about 30 per cent. Plant switches by continuing firms are also important relative to new plant creation by continuing firms. They account for 0.9 per cent of 1979 shipments (row 7, Table 5) compared to de novo plant share for continuing firms of 4.4 per cent on average (row 6, Table 5). In conclusion, switches cannot be ignored since they have the potential to substantially affect the calculated long-term entry and exit rate.

Table 5

Importance of Categories for Entry Between
1970 and 1979 in Canadian Manufacturing
Using Alternate Data Sets:
(calculated as the mean across 167 4-digit industries)

Category	Share of Number of Plants		Share of Shipments	
	Total Sample	Long Form Sample	Total Sample	Long Form Sample
All	100.0	100.0	100.0	100.0
All Entering Firms by				
1) Plant Birth(23)	36.9	18.8	14.4	11.5
2) Acquisition(22)	6.5	8.7	10.4	10.7
3) Plant Transfer(26)				
a) no change in plant ownership	3.5	4.7	3.3	3.5
b) change in plant ownership	0.6	0.9	1.0	1.1
All Continuing Firms				
4) Continuing Establishments(15)	46.8	59.2	63.0	65.0
5) Acquired Plant(12)	1.6	2.2	2.8	3.0
6) New Plant(13)	3.6	4.6	4.2	4.4
7) Plant Transfer(16)	0.5	0.7	0.9	0.9

Note:1) for definitions of categories, see Table 1 and the text.
2) the importance of the various entry categories is
measured as the number or shipments of plants owned by firms
in a particular category as a percentage of all plants or
all shipments in an industry.
3) the mean is taken across all industries --including those
that have a value of zero in a particular category.

Source: Special Tabulations: Business and Labour Market Analysis
Group. Statistics Canada.

Table 6

Importance of Exit Categories in
Canadian Manufacturing Industries: 1970-79
for Alternate Data Sets
(calculated as the mean across 167 4-digit industries)

Category	Share of Number of Plants		Share of Shipments	
	Total Sample	Long Form Sample	Total Sample	Long Form Sample
All	100.0	100.0	100.0	100.0
All Exiting Firms				
1) Plant Death(34)	32.4	24.6	14.1	13.3
2) Divestiture(31)	8.5	10.0	12.5	12.7
3) Transfer(37)				
a) no change in ownership	3.8	4.3	3.4	3.5
b) change in ownership	0.6	0.8	1.3	1.3
All Continuing Firms				
1) Continuing(15) Establishments	50.6	55.3	62.9	63.4
2) Divested Plant(11)	0.5	0.6	1.1	1.1
3) Closed Plant(14)	3.3	3.8	3.7	3.8
4) Transfer(17)	0.4	0.5	0.8	0.8

Note:1) for definition of categories, see Table 1 and the text.
2) the importance of a category is defined on the basis of
the number of plants or the shipments of plants in that
category as a percentage of all plants or shipments.
3) the mean is taken across all 167 industries.
Source: Special Tabulations: Business and Labour Market Analysis
Group. Statistics Canada.

- Horizontal mergers

As was indicated previously, measurement of the importance of horizontal mergers requires an estimate of the extent to which the entry and exit by acquisition category contains a horizontal component. In order to measure the importance of the horizontal component of acquired and divested plants, a decision had to be made as to which firms would be classified as doing the acquiring and which would be the acquired.[25] In most instances involving horizontal mergers in the acquisition and divestiture category, it was evident that a firm with many plants was merged with one with few plants. Therefore, the smallest of the partners (measured in terms of shipments) was defined as the acquired and only its sales were counted as being affected by the horizontal merger. This is essentially how the importance of horizontal mergers was calculated in Table 6, since acquiring continuous firms were generally larger than the plants acquired.

The shipments of plants acquired during the diversification process that were also horizontal mergers was expressed as a percentage of shipments in each industry. Across 167 industries, this ratio averaged 1.1 per cent using 1979 shipment values of acquired plants and 1.5 per cent for 1970 shipment values of divested plants. This, it could be argued, is the amount of the underestimate of the horizontal merger component. The previous estimate of the average importance of horizontal mergers across 167 4-digit industries was 3.0 per cent for acquired plants as of 1979 as reported in Table 5. While the importance of horizontal mergers is increased by recognizing that some of the new firm and exiting firm acquisition and divesture activity involve a horizontal component, it is still small relative to the importance of entry by acquisition (category 22) as reported in Table 5.

- Overlap in Entry and Exit Categories

In order to investigate the extent of this problem, the number of establishments and the number of firms in the various entry categories were estimated for a reduced 141 industry sample -- a sample that was used for regression analysis of entry. (Baldwin and Gorecki, 1987) Only long-form establishments were used.

Across 141 4-digit manufacturing industries, an average of 24.6 firms per industry had entered by 1979, 4.9 by acquisition, 21.7 by de novo plant building.[26] Therefore, of the 24.6 entrants, 2 on average entered over the period 1970-79 by both acquiring plant and building new plant. In terms of exits, on average 38.3 of the existing firms as of 1970 exited over the decade, 7.2 by divestiture and 33.2 by scrapping. Thus of the 38.3 exits, about 2.1 on average exited over the period 1970-79 by both divestiture and scrapping of plant.[27]

In the continuing firm category, there were 50.3 firms on average--that possessed plant in the industry in the initial and terminal years. There were 49.8 owning plants that stayed in the industry over the decade, 1.6 that divested plants and 3.7 that scrapped plants. The sum of the subcategories (55.1) is about 10 per cent greater than the number that continued (50.3). Roughly the same overlap exists on the entry side when the number of continuing firms in 1979 is examined.

Measuring Entry and Exit in the Short Run

As was indicated above, two data bases were created to measure short-run entry and exit to the manufacturing sector. The first tracks establishments annually through the period 1970-82. The second tracks enterprises year by year over the same period. The short-run data bases measure entry and exit only at a high level of industry aggregation--the manufacturing sector as a whole.

A number of problems arose when short-run entry and exit were measured. These are discussed in the following two sections. The first deals with the establishment data base; the second deals with the enterprise data base.

The Annual Establishment Data Base

- Choice of Sample

Entry and exit data can be generated using all establishments, just long-form establishments, or just short-form plants. It was decided to use only long-forms because, amongst other things, the constantly varying coverage of short-forms would give rise to specious entry and exit[28] -- especially in the case of the measurement of annual rates of entry and exit. In a previous section, it was demonstrated that long-form data closely proxy the results of the total census for the longer-run period from 1970 to 1979--at least when entry is measured by the amount of shipments or employment affected.

For the short-run data base, the use of long-forms alone as a sample criterion is inadequate. The line of demarcation between short- and long-forms changed over time. Because of this, the use of long-form data alone would produce some changes in entry and exit purely as a result of reclassification. This problem was resolved by taking as the longitudinal establishment sample all establishments that completed a long-form on at least one occasion. An establishment then is classified as entering in a particular year, because it made its first appearance in that year and either was already a long-form, or eventually became a long-form at a later date.

This technique serves to reduce but not to eliminate the problems that shifting boundaries between short- and long-form establishments produce. It essentially smooths out the fluctuations by eliminating the most volatile component -- establishments just at the boundary. Since the boundary changes are generally small, this is sufficient most of the time; but, there are two occasions when major changes in census coverage occurred. For these instances, corrections in the estimates of entry and exit were required.

- Major revision in long-form coverage in 1975

The cut-off between a short-form and a long-form experienced a major revision in 1975.[29] During the early 1970s, Statistics Canada raised the cut-off point slowly to maintain approximately the same percentage of establishments in each category. But in 1975, the cut-off point was increased dramatically in order to reduce respondent burden for smaller manufacturers. As a result, the percentage of short-form establishments increased from 36.1 per cent in 1974 to 50.1 per cent in 1975. There was no subsequent increase in the percentage of establishments in the short-form category of a similar magnitude, though the percentage of short-forms drifts slowly upward over time. By 1983, it was 54.9 per cent of all establishments, as compared to 50.1 per cent

in 1975. Over the same period, the percentage of employees in short-form establishments increased slowly from 7.6 to 8.7 per cent.

The reclassification of the boundaries between long- and short-forms in 1975 will have less of an effect on estimates of entry and exit with the use of the modified long-form sample adopted here.[30] This is because establishments that entered in 1975 as short-forms, but that eventually grew to become long-forms--albeit a harder task after 1975 because of the higher cut-off point used to define long-forms--will still be caught. However, it does not completely eliminate the problem. Those establishments that would have made the transition from a short- to a long-form under the pre-1975 definition of a long-form, but do not do so under the new definition, will be missed.

That there is some reduction in measured entry because of the 1975 change is evidenced by the increase in the average size of entering establishments that occured subsequently. Entering establishments averaged 20 employees per establishment between 1970-1 to 1972-3, but 28.1 employees per establishment between 1975-76 and 1980-81. The increase in plant average size occurred abruptly at the time of the reclassification of establishments between the long-form and short-form categories in 1975.

In order to calculate the effect of the 1975 redefinition on the estimated entry rates, the distribution of entrants in 1973-74 was truncated by removing the smallest entrants until the average size of those remaining was equal to the post-1975 size of the average entrant. On average, this required removing 32.1 per cent of entrants accounting for 4.5 per cent of employees of all entrants. This is the estimate of the percentage reduction in the pre-1975 entry figures required to make them comparable to those calculated for the remainder of the period.[31]

Reliance on the long-form sample produces a second measurement problem that is revealed by data presented in Table 7. Column II contains the number of establishments that filed an Annual Census of Manufactures questionnaire--whether long- or short-form. Column III contains the number of establishments defined for inclusion in the longitudinal data base--those completing a long-form questionnaire at least once. The coverage of the establishment sample (column IV) declines over time reflecting the reliance on long-forms in this study and their decreasing importance in terms of number of establishments over time. This should not greatly affect the rate of entry and exit when calculated as a proportion of number of firms or establishments at a point in time. The bias will be even less where entry and exit is measured in terms of employment, because of the relatively small size of the short-form establishments. Nevertheless, annual rates of entry using the long-form sample are calculated only for the period up to 1982. After that year, the sample does not have enough years at the moment to capture fully the transition of a short-form to a long-form plant. Therefore, it will increasingly underestimate entry rates. This can be overcome as more years of data become available.

- Variation in Census Coverage

The second problem arose because of a major change in census coverage. If left uncorrected, this change would have given a false increase in the entry reported in these two years and under-reported both entry and exit in prior years.

A major change in coverage in the Canadian Census of Manufactures occurred in 1978. In 1972, Statistics Canada lost a source of administrative information used to identify possible new establishments.[32] The result was a decline in coverage that was not rectified until 1978 and, to a lesser extent, 1979. In 1978, for example, 3,820 new

Table 7

The Number of Enterprises and Establishments
Classified to the Manufacturing Sector[1]
Using Various Criteria, 1971-82

Year	Establishments in Manufacturing			Enterprises in Manufacturing		
	As recorded Statistics Canada[2]	As defined herein[3]	Ratio of III/II	As recorded Statistics Canada[4]	As defined herein[5]	Ratio of VI/V
I	II	III	IV	V	VI	VII
1971	31,908	21,948	68.79	-	17,402	-
1972	31,553	21,896	69.39	26,926	17,265	64.12
1973	31,145	21,823	70.07	-	17,163	-
1974	31,535	22,126	70.16	26,875	17,413	64.79
1975	30,100	21,959	72.95	-	17,044	-
1976	29,053	21,530	74.11	-	16,602	-
1977	27,716	20,797	75.04	-	15,939	-
1978	31,963	21,846	68.35	26,865	16,739	62.31
1979	34,578	21,986	63.58	-	16,812	-
1980	35,495	22,077	62.20	30,160	17,715	55.42
1981	35,780	21,659	60.53	30,270	16,179	53.45
1982	35,834	21,212	59.20	30,364	15,725	51.79

Notes:1) Defined using the 1970 SIC definition of the
        manufacturing sector.
     2) Statistics Canada(1986, Table 1, P.2)
     3) See text for details.
     4) Statistics Canada (1983, Text Table VII, p.15) for
        1978 and 1980, the corresponding table in earlier
        issues of this biannual publication and for 1981 and
        1982 preliminary data made available to the authors.
        Note prior to 1980 the data are published biannually.
        No data were available for 1970 or 1976.
     5) See text for details.

establishments were added to the Census of Manufactures that Statistics Canada believed were already in existence. These "new" units accounted for 12 per cent of the total establishment count in 1978; however, since the majority were very small, and the increase in manufactured shipments due to their addition was much less significant, these "new" establishments accounted for only 1.7 per cent of the 1978 employment total.[33] In 1979, a further 1,142 preexisting establishments were added because of improvements in coverage. They accounted for only 3.3 per cent of the 1979 establishment total and only 0.37 per cent of the employment total.[34]

Annual rates of entry for the manufacturing sector as a whole are presented in Table 8. They are calculated using the number of new establishments relative to total establishment counts in the previous year and the employment in new establishments as a percentage of employment in the previous year. Column I in each case contains the estimated rates of entry prior to corrections. Rates of establishment exit are presented in Table 9. Once again, column I contains the estimates prior to any corrections. The entry rates, even though based on long-form establishments, or those that would eventually become long-form, do show an abnormal increase in 1978 (see Table 8, column I).

In order to correct for the change in coverage, the number of entrants and the employment associated with them that resulted from the increased coverage were identified and used to correct the entry and exit rates presented in columns I of Tables 8 and 9.

The correction employed for the 1978 and 1979 rates was straightforward. The overlap was subtracted.

The correction for previous years was more complicated. Because of the high death rate for new entrants, simple assignment of the 1978 and 1979 increased coverage figures to the earlier years would have understated earlier births. To correct for this, two assumptions were made: first, that the total number of births missed was distributed across the years 1972 to 1977 in proportion to those actually reported;[35] second, that the missed entrants died at the same rate after birth as those greenfield entrants actually reported. This allowed estimation of the missing entrants by year between 1972 and 1977. The employment associated therewith was calculated by assuming that the number of employees in each missed birth was the same as the average in those actually captured. The corrected entry rates are reported in columns II and IV of Table 8.

The uncorrected exit rate data contained in columns I and III of Table 9 were also revised to allow for the fact that the undercoverage of entry in the mid 1970s would have led to a downward bias in calculated exit rates. Once again, the data for the rate of exit of greenfield entrants was used and applied to the additional entrants. The corrected exit rates are reported in Table 9, column II for numbers of establishments and in column IV for employment affected by plant closure. The corrections have little effect on the average rate of entry or exit calculated over the decade.

The Annual Enterprise Data Base
An enterprise is defined as all establishments in manufacturing and primary industries [36] under common control. If more of the enterprises's activity[37] is classified to a 4-digit manufacturing industry than any 4-digit industry in mining or logging, then the enterprise is classified to the manufacturing sector. Our sample of enterprises used for the short-run data base consists of those classified to the manufacturing sector.[38]

Table 8

Annual Establishment
Entry Rates to Manufacturing,
Corrected for Coverage Changes
1971-1982

Year	Entry Rates Using Numbers of Establishments		Entry Rates Using Employment	
	I	II	III	IV
1971	3.39	2.31	2.22	2.12
1972	4.50	4.44	1.23	1.84
1973	4.82	4.67	1.18	1.80
1974	5.56	5.30	1.44	2.12
1975	4.74	6.52	1.45	2.13
1976	2.76	3.75	1.05	1.14
1977	1.84	2.22	0.68	0.90
1978	10.34	4.10	3.34	1.49
1979	4.84	3.46	1.65	1.14
1980	5.00	5.00	1.77	1.77
1981	3.42	3.42	1.27	1.27
1982	6.12	6.12	2.21	2.21
1983	4.59	4.59	1.58	1.58
Mean	4.73	4.30	1.62	1.65

Note: columns I and III: the uncorrected entry rates
      columns II and IV: the corrected entry rates. See text for
      explanation.

Source: Special Tabulatations: Business and Labour Market
        Analysis Group. Statistics Canada.

Table 9

Annual Establishment Exit Rates
from Canadian Manufacturing,
Corrected for Coverage Changes
1971-1982

Year	Exit Rates Using Numbers of Establishments		Exit Rates Using Employment	
	I	II	III	IV
1971	4.91	4.91	1.80	1.80
1972	5.14	5.43	1.87	1.96
1973	4.15	4.40	1.50	1.59
1974	5.53	5.99	1.57	1.77
1975	4.80	5.29	1.65	1.88
1976	5.11	5.55	2.18	2.45
1977	5.08	5.45	1.83	2.09
1978	4.42	4.29	1.78	1.86
1979	4.58	4.53	1.42	1.42
1980	5.40	5.40	1.90	1.90
1981	7.97	7.97	2.61	2.61
1982	5.92	5.92	2.53	2.53
1983	5.25	5.25	2.22	2.22
Mean	5.25	5.41	1.91	2.01

Note: columns I and III: the uncorrected exit rates
      columns II and IV: the corrected exit rates. See text for
      explanation.

Source: Special Tabulations: Business and Labour Market Analysis
        Group, Statistics Canada.

• Choice of sample

In the previous discussion, three reasons were adduced for excluding short-form establishments. These arguments also apply for enterprises that own short-form establishments. Such enterprises will tend to be almost exclusively single establishment enterprises, since establishments belonging to multi-industry, multi-establishment enterprises always complete long-form questionnaires.[39] Establishments that belong to single industry, multi-establishment enterprises are also likely to complete a long-form questionnaire, since they are large compared to single establishment enterprises.[40] In view of these factors, it was decided to exclude enterprises that (a) <u>always</u> owned only a single establishment (using the multi/single establishment code), <u>and</u> (b) the establishment <u>always</u> completed a short-form questionnaire.

The sample of enterprises thus consists of those classified to the manufacturing sector, but excludes those enterprises that always owned a single establishment that in turn always completed a short-form questionnaire for the Annual Census of Manufactures. In Table 7, the number of consolidated enterprises classified to the manufacturing sector and the number in the sub-set selected for use in this study are tabulated.

• Treatment of temporary exits

In a small number of instances, a plant or all of the establishments owned by an enterprise failed to report for a given year, but reported prior and subsequent to that year. If the rules outlined above were used, this would have been classified as an exit and subsequent entry, rather than a continuing plant or enterprise. Officials at Statistics Canada suggested that such failure to report could be due to a number of factors: a fire, strike, major overhaul of equipment, or slack demand. These situations were reclassified and the plant or firm was counted as continuing rather than as an exit or entrant.

• The possibility of switches

The final problem relates to the possibility that plant exit did not involve plant closure, but rather plant reassignment. This issue was addressed previously when plant entry and exit were being measured at the 4-digit level. There, plant switches from one 4-digit to another 4-digit manufacturing industry had to be considered.

At the aggregate level being used to examine entry and exit in the short run, a different type of reassignment may be important. It may be that firms exit from manufacturing by switching to wholesaling. This would be recorded as an exit because the enterprise ceases to file a Census of Manufactures questionnaire. While certainly an exit, it is not a closure; for some purposes, this type of reassignment might best be excluded from the analysis.

It is possible, with the data bases at Statistics Canada, to trace an enterprise and the establishments it owns if they leave the manufacturing sector and switch to the wholesale/retail sector. However, after some preliminary research, the cost of this procedure became exorbitant. Hence, a second best option was selected.

The data available from the Census of Manufactures permit the issue of exit to wholesaling to be explored in an alternate way. Each plant records its activities under two broad headings--manufacturing activity and non-manufacturing activity. The sum of the two is total activity. An important component of non-manufacturing activity is the purchase of goods for resale in the same condition as purchased.[41] This is essentially

a wholesaling operation. By estimating, for the enterprise that is classified as an exit by closing, the ratio of manufacturing shipments to total activity shipments, an indicator of the importance of wholesaling operations just prior to exit may be generated. The higher is this ratio, the lower is the probability that the enterprise exited by switching its function to wholesaling. The results for a sample year are presented in Table 10. The enterprises are classified according to the ratio of manufacturing to total shipments in the year of exit. As will be readily apparent, the majority of enterprises that exit by plant scrapping are indeed almost certainly genuine exits, given the small amount of non-manufacturing activity. Thus, the issue was pursued no further.

- Determination of entry and exit method

The definition of enterprise exit and entry in the previous section made no attempt to distinguish between the alternate methods of entry and exit. As has already been described, an enterprise may exit the manufacturing sector by either closing all of the plants it owns; or it may do so by selling the plants it owns to another enterprise--by divestiture. Equally, an enterprise may enter the manufacturing sector, by building a new plant, or by purchasing plants of existing enterprises--by acquisition. In the analysis of long-run enterprise entry and exit, these different methods of entry and exit were differentiated.[42] The same distinction is made for the short-run estimates.

In considering the method of entry in the short run, the following approach was used to determine if the firm entered by acquisition, as opposed to by plant creation: if the entrant first filed an Annual Census of Manufactures questionnaire in a particular year and the establishment(s) it owned in that year existed in the previous year, then the firm was classified as having entered by acquisition; if the plants did not exist in the previous year, then the enterprise was classified as having entered by plant creation. The same approach was used to distinguish the method of exit: if the exiting firm last filed an Annual Census of Manufactures questionnaire in a particular year and the plants it owned in that year were still alive in the next or subsequent year (but under a different owner), then the firm was classified as exiting by divestiture; if the plants did not file an Annual Census of Manufactures form in the next subsequent year, then the firm was classified as exiting by closing plant.[43]

A potential problem may arise either if an enterprise enters by both acquiring plants and building new plants, or if an enterprise exits by both divestiture and plant closing. This could be handled by counting the firm twice or by creating a new category--for example, entry by both acquisition and building new plants. Alternately, this firm could be assigned to one or other category on the basis of the importance of plants created in comparison to plants acquired.

The implications of using the first approach can be ascertained from the data that were employed to measure long-run entry and exit. While some firms entered both by building new plant and by acquiring it, the overlap was relatively small. These data come from comparing firm status in 1970 and 1979, a period that spanned a full decade. The possibility that a firm could enter by one route and then expand by the other should be greater for a ten-year period than for the annual period adopted to measure short-run entry. Thus, there should be much less overlap between the two methods of entry in any study that relies upon annual data.

In view of this, it was decided that it would be appropriate to count an entrant as either entering by plant creation or by plant acquisition. Therefore, an enterprise entrant was assigned to one or other of the two entry categories on the basis of the employment in the plants created versus the plants acquired. In those cases where an enterprise was

Table 10

The Ratio of Manufacturing to Total Shipments[1] for
Enterprises that Exited[2] the Manufacturing
Sector in 1982[3]

Ratio of Manufacturing To Total Shipments	Percentage and Number Of Enterprises Classified to each Category		Percentage of Manufacturing Shipments Classified to Each Category
	Per Cent	Number	Per Cent
0.00 - 0.0999	0.17	1	0.00
0.10 - 0.1999	0.51	3	0.14
0.20 - 0.2999	1.20	7	0.49
0.30 - 0.3999	2.05	12	1.80
0.40 - 0.4999	1.20	7	0.66
0.50 - 0.5999	2.56	15	5.61
0.60 - 0.6999	2.56	15	2.19
0.70 - 0.7999	3.08	18	3.27
0.80 - 0.8999	4.27	25	4.13
0.90 - 0.9999	11.11	65	30.57
1.00	71.28	417	51.14
Total	100.00	585	100.00

Note:1) These ratios are built up from data reported for each
establishment in completing a Census of Manufactures
questionnaire. However, for short form questionnaires the
distinction between manufacturing and total shipments cannot
be made. Hence, the table refers only to enterprises which
exited in 1982 which had at least one long-form
establishment in that year.
2) Where the method of exit is by plant closure.
3) Using the 1980 SIC

Source: Special Tabulations: Business and Labour Market Analysis
Group. Statistics Canada.

classified as multi-plant, care was exercised to make sure the appropriate choice had been made.

CONCLUSION

Longitudinal panel data on firms and plants promise to teach us much about the dynamics of the competitive process that have until now been difficult to measure. Such data can describe the importance of the entry and exit process and the extent to which the growth and decline of incumbents causes firms to change their relative rankings. Longitudinal data can be used to ascertain whether mergers provide an important source of turnover. All these questions focus, in one way or another, on the extent and source of firm turnover. Equally important are a set of questions that focus on the effect of turnover on productivity and profitability.

Answers to these questions require data bases that can track firms over time. The construction of these bases is not straightforward. Difficult problems have to be resolved. This paper has been devoted to a description of how they were met in the case of the Canadian data reported herein. It is meant to permit the reader of the accompanying studies to evaluate both the strength and weakness of the research and to compare it, when appropriate, to the results of studies for other countries that use other data sources.

NOTES

1. Of course, a merger may turn around an otherwise declining plant and generate employment in this fashion. Longer-run job turnover studies might then examine the extent to which acquired plants grew relative to the rest of the population.

2. As such, it excludes head offices and similar activities if they are located separately from the establishment or if they serve more than one establishment. For further details, see Statistics Canada (1979, pp. 11-15).

3. An establishment may undertake a number of different activities. To be classified to the manufacturing sector, the preponderance of these activities (based on value-added) must be in manufacturing. The manufacturing sector is defined as Division 5 of the 1970 Standard Industrial Classification. For details, see Dominion Bureau of Statistics (1970, pp. 23-43).

4. There are a number of differing reporting units under the Census of Manufactures, including head offices and other auxiliary facilities. Attention is paid here only to establishments. For further details, see Statistics Canada (1979, p. 10).

5. See, for further details, Statistics Canada (1979, pp. 17-18; 1983, pp. 23-25).

6. In order to determine whether one legal entity controls another, attention is paid not only to cases where, directly or indirectly, one company "has more than 50 per cent of the exercisable voting rights of the subsidiary corporation"(Statistics Canada, 1979, p.17), but also to cases of minority control, "if factual information exists or acknowledgement by the entity in question is obtained" (Statistics Canada, 1983, p. 25).

7. In some instances, several establishments may file a combined record. In these cases, the original statistics are projected by Statistics Canada across the individual establishments, each of which has a separate RSN.

8. See McVey (1981, p. 72). The longitudinal enterprise code was maintained for the purpose of estimating concentration and foreign ownership statistics by J. McVey with the aid of J. Bousfield, B. Mersereau, and J. Lacroix.

9. The results indicate that there was little difference in the annual entry and exit rates calculated with and without these exclusion criteria.

10. Statistics Canada (1983) and "A Summary of the Establishment Description Tape File. unpublished internal working document, Ottawa, Appendix C-1. p.2.

11. This is often the case for data bases used for U.S. studies that are generated from unemployment insurance or Dun and Bradstreet records. For a discussion of the problems with these data bases, see Baldwin and Gorecki (1990)

12. The country of control categories were Canada, U.S., U.K., other Europe, and other foreign.

13. A continuing firm is one that can be found in some 4-digit manufacturing industry in both the terminal and initial years of the comparison.

14. A plant that is assigned to the entry by acquisition or exit by divestiture categories may also be involved in a horizontal merger. Such a merger may take place before or after the acquisition.

15. See Johnson and Storey (1985) for a criticism of the Dun and Bradstreet data bases.

16. See Storey (1985).

17. The data for small plants that are taken from taxation administrative records in place of a mailed short-form questionnaire and the short-form records are both referred to here, for convenience, as "short-form".

18. See Statistics Canada (1979, p. 44 and 1984, p. xiv). These figures refer to "small" establishments, which appear to be largely short-form establishments. See Statistics Canada (1979, pp.43-44).

19. These figures concerning short-form establishments for 1970, 1979, and 1982 are drawn from the same sources as footnote 18.

20. Statistics Canada (1979, p. 42).

21. To cite an earlier study on exit/entry conducted using census of manufactures data that excluded short-forms (McVey, 1981,p. 71).

22. For a discussion of the total activity concept used in the census of manufactures, see Statistics Canada (1979, pp. 21-22). Measures of employment size for enterprises cover all employment including headquarters--that is, the employment of ancilliary units as well as that of operating establishments is included in the total.

23. See Statistics Canada (1988) where this assumption is employed.

24. Measures based on total employment are very similar to those based on shipments.

25. This problem does not arise in category 12 since the acquiring firms' ENT code stays in the industry. The cases where problems arise are those where two or more ENT codes are replaced by a new one.

26. See Baldwin and Gorecki (1983, Table 3, p. 15).

27. See Baldwin and Gorecki (1983, Table 3, p. 15).

28. Statistics Canada (1979, pp. 12-13).

29. Statistics Canada, (1979, pp. 43-44).

30. The amount of follow-up by Statistics Canada which determines whether an establishment should be classified as a long-form also varies over time. This will have less of an effect on this measure as long as an establishment that becomes large enough to receive a long-form is eventually caught. Of more concern is the probability that an entrant that is long-form upon entry is not caught by the system at the end of the year. The quality of the administrative data sources used and Statistics Canada's own reputation for diligence makes this unlikely.

31. Although the cut-off point subsequently drifts upwards, the increase in the percentage of short-forms by 1983 is relatively minor--only about 4 percentage points. In light of the relatively small correction required for entry rates at the 1975 revision, which increased short-form establishments by 14 percentage points, the corrections were taken no further.

32. Potter (1982, p. 21).

33. Canada, Statistics Canada (1980, p. ix).

34. Canada, Statistics Canada (1981, p. x).

35. Alternate assumptions about the distribution of omitted entrants were found to have little impact on the mean of the annual birth and death rates for the decade.

36. In terms of the 1970 Standard Industrial Classification, these are Division 2, Major Group 1, Logging; Division 4, Mining (except Crude Petroleum and Natural Gas Industry and Major Group 5); and Division 5, Manufacturing. For full details, see Dominion Bureau of Statistics (1970, p. 17). In 1980, value-added of enterprises classified to manufacturing was $66,472 million; to mining, $9,062 million; and logging, $702 million (Statistics Canada, 1983, Text Table VII, p. 15).

37. Manufacturing value-added is used to classify the enterprise to a 4-digit SIC on the basis of the largest unconsolidated enterprise owned by the consolidated enterprise. For details of these two enterprise concepts, see Statistics Canada (1983, pp. 28-30).

38. Using this definition of enterprises, there were 30,160 manufacturing enterprises in 1980 (Statistics Canada, 1983, Text Table VII, p. 15); however, if a manufacturing enterprise is defined as consisting only of establishments classified to the manufacturing sector, then there would be 30,197 enterprises classified to the manufacturing sector (Statistics Canada, 1983, Text Table XIII, p. 21). Hence there were 37 enterprises classified to mining or logging with activities in manufacturing. For example, a mining firm could own a small smelter. Hence, in terms of numbers, it makes little difference how we define the universe of manufacturing firms.

39. Statistics Canada (1979, p. 43) and McVey (1981, p.71).

40. For details, see Statistics Canada (1983, Text Table VII, p. 15).

41. See Statistics Canada (1979, p. 37), for further details.

42. No corresponding problem arises for establishment entry or exit. An establishment that exits the manufacturing sector--fails to file an Annual Census of Manufactures questionnaire--is assumed to exist no longer. In the terminology used here, it has exited by closing. Similarly, establishment entry can only occur de novo--the building of a new plant.

43. An alternative to matching whether an establishment filed an Annual Census of Manufactures questionnaire in year t and t+1 to determine whether the enterprise exited via closing plant is to refer directly to question 1.3.2 in the Annual Census of Manufactures questionnaire, which asks "Did this establishment go out of business during the reporting year?", to which the answer had to be "Yes" or "No" (Statistics Canada, 1979, p. 79). Work conducted within the Business Micro-data Integration and Analysis group of Statistics Canada suggested that matching the establishment Annual Census of Manufactures questionnaire between year t and t+1 was more reliable than accepting the answer to question 1.3.2.

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